UNBRIDLED LEARNING
THE VISION FOR KENTUCKY'S FUTURE

GRADE

8

KENTUCKY

K-PREP

Kentucky Performance Rating For Educational Progress

MATH SAMPLE ITEMS

Spring 2012

EVERY CHILD
PROFICIENT & PREPARED FOR SUCCESS
KENTUCKY DEPARTMENT OF EDUCATION

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The following are the general guides that will be used to evaluate your responses to short-answer and extended-response questions in this test.

Kentucky Short-Answer Questions General Scoring Guide

Score Point 2	• You complete all components of the question and communicate ideas clearly. • You demonstrate an understanding of the concepts and/or processes. • You provide a correct answer using an accurate explanation as support.
Score Point 1	• You provide a partially correct answer to the question and/or address only a portion of the question. • You demonstrate a partial understanding of the concepts and/or processes.
Score Point 0	• Your answer is totally incorrect or irrelevant.
Blank	• You did not give any answer at all.

Kentucky Extended-Response Questions
General Scoring Guide

Score Point 4	• You complete all important components of the question and communicate ideas clearly. • You demonstrate in-depth understanding of the relevant concepts and/or processes. • Where appropriate, you choose more efficient and/or sophisticated processes. • Where appropriate, you offer insightful interpretations or extensions (generalizations, applications, analogies).
Score Point 3	• You complete most important components of the question and communicate clearly. • You demonstrate an understanding of major concepts even though you overlook or misunderstand some less-important ideas or details.
Score Point 2	• You complete some important components of the question and communicate those components clearly. • You demonstrate that there are gaps in your conceptual understanding.
Score Point 1	• You show minimal understanding of the question. • You address only a small portion of the question.
Score Point 0	• Your answer is totally incorrect or irrelevant.
Blank	• You did not give any answer at all.

KENTUCKY MATHEMATICS REFERENCE SHEET
Grades 7 and 8

FORMULAS FOR PLANE FIGURES

Parallelogram: $A = bh$

Trapezoid: $A = \frac{1}{2}(b_1 + b_2)h$

Triangle: $A = \frac{1}{2}bh$

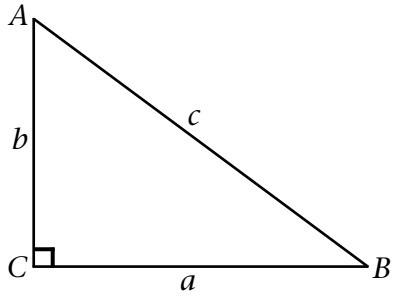
Circle: $C = 2\pi r$

$A = \pi r^2$

Right Triangle:

The Pythagorean Formula

$c^2 = a^2 + b^2$



FORMULAS FOR SOLID FIGURES

Right Prism: $V = Bh$ (B is the area of the base.)

Right Cylinder: $V = \pi r^2 h$

Regular Pyramid: $V = \frac{1}{3}Bh$

Cube: $V = e^3$

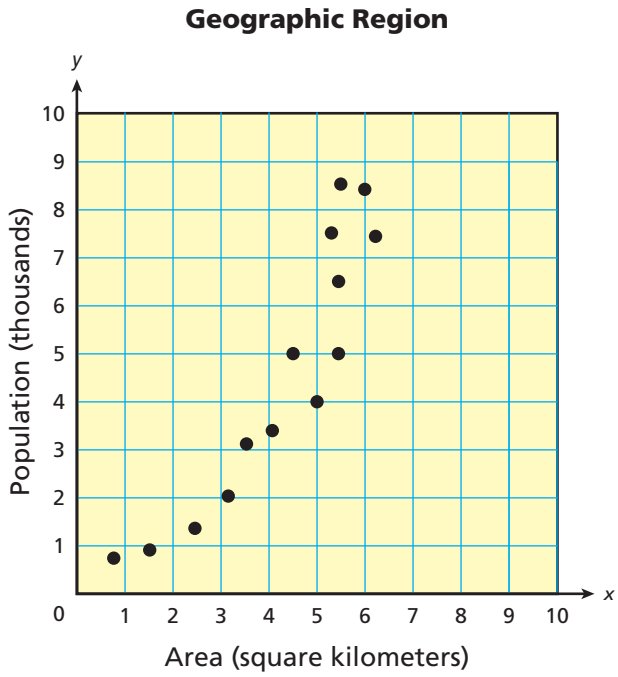
$SA = 6e^2$

Cone: $V = \frac{1}{3}\pi r^2 h$

Sphere: $V = \frac{4}{3}\pi r^3$

1

The scatter plot below represents the areas and populations of the towns in one geographic region.

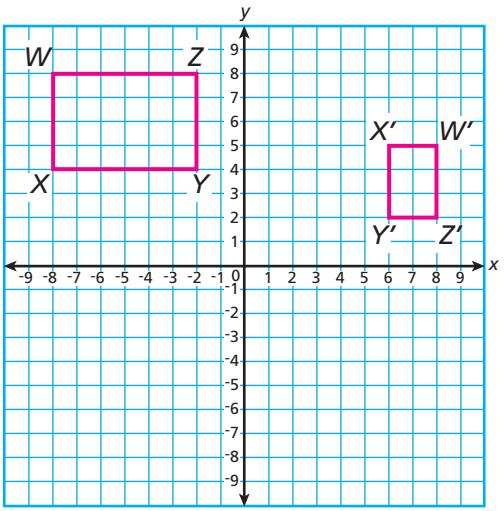


Which pair of words best describes the relationship between the variables in the scatter plot?

A Negative, linear
B Positive, linear
C Negative, nonlinear
D Positive, nonlinear

2

The coordinate plane shows two figures.



Which two transformations of Figure *WXYZ* show that it is similar to Figure *W′X′Y′Z′*?

A Figure *WXYZ* has a translation 9 units to the right and a $90°$ counterclockwise rotation about point *Y*.

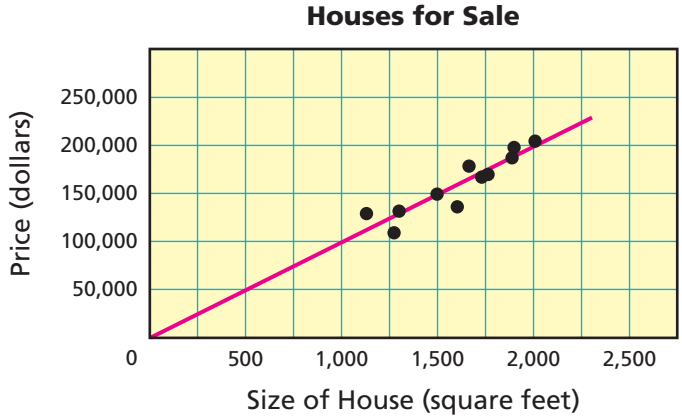
B Figure *WXYZ* has a reflection over the *y*-axis and a dilation with a scale factor of $\frac{1}{3}$ with point *X* as the center of dilation.

C Figure *WXYZ* has a $90°$ clockwise rotation about the origin and a dilation with a scale factor of $\frac{1}{2}$ with point *Z* as the center of dilation.

D Figure *WXYZ* has a $270°$ counterclockwise rotation about the origin and a dilation with a scale factor of 2 with point *W* as the center of dilation.

3

The prices and sizes of several houses for sale in a neighborhood are shown in the scatter plot below.



Which equation represents the line of best fit?

A $y = 100x$
B $y = 100x + 50{,}000$
C $y = 1{,}000x$
D $y = 1{,}000x + 50{,}000$

4

Which of the following represents the solution to a system of linear equations on graphs?

A The slopes of the lines

B The x-intercepts of the lines

C The y-intercepts of the lines

D The point at which the lines intersect

5

Sharla's batting average in softball is $0.58\overline{3}$. She wants to know the fraction equivalent to the decimal. Which fraction represents Sharla's batting average?

A $\frac{5}{8}$

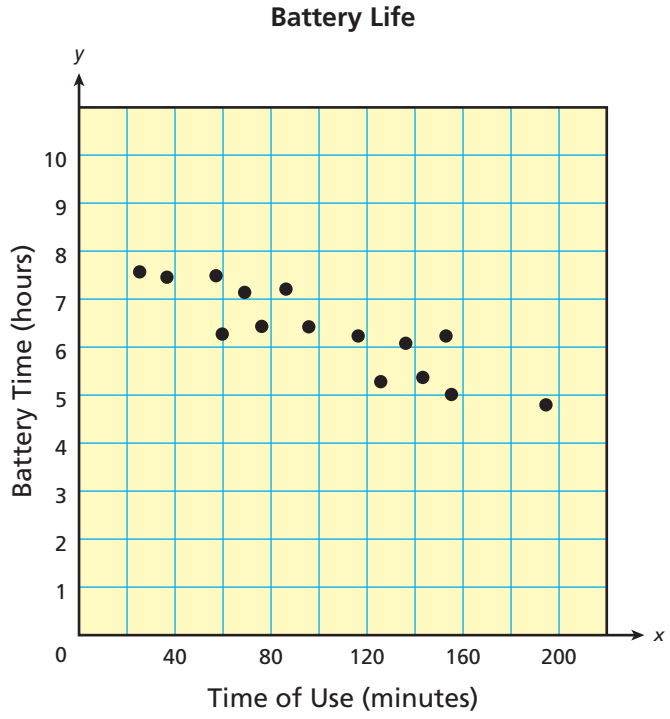
B $\frac{5}{9}$

C $\frac{7}{11}$

D $\frac{7}{12}$

6

An electronics manufacturer tested the battery life of new cell phones. The scatter plot shows the time, in hours, the battery lasts (y) based on the number of minutes the phone is used (x) for each of fifteen cell phones.



Part A Which equation below would be better as the line of best fit? Explain your thinking.

$$y = \left(-\frac{1}{100}\right)x + 7 \qquad y = \left(-\frac{3}{200}\right)x + 8$$

Part B Explain what the slope represents in this situation.

RUBRIC	
Score Point 2	• You complete all components of the question and communicate ideas clearly. • You demonstrate an understanding of the concepts and/or processes. • You provide a correct answer using an accurate explanation as support.
Score Point 1	• You provide a partially correct answer to the question and/or address only a portion of the question. • You demonstrate a partial understanding of the concepts and/or processes.
Score Point 0	• Your answer is totally incorrect or irrelevant.
Blank	• You did not give any answer at all.
Note: No part can be incomplete or incorrect and receive full credit.	

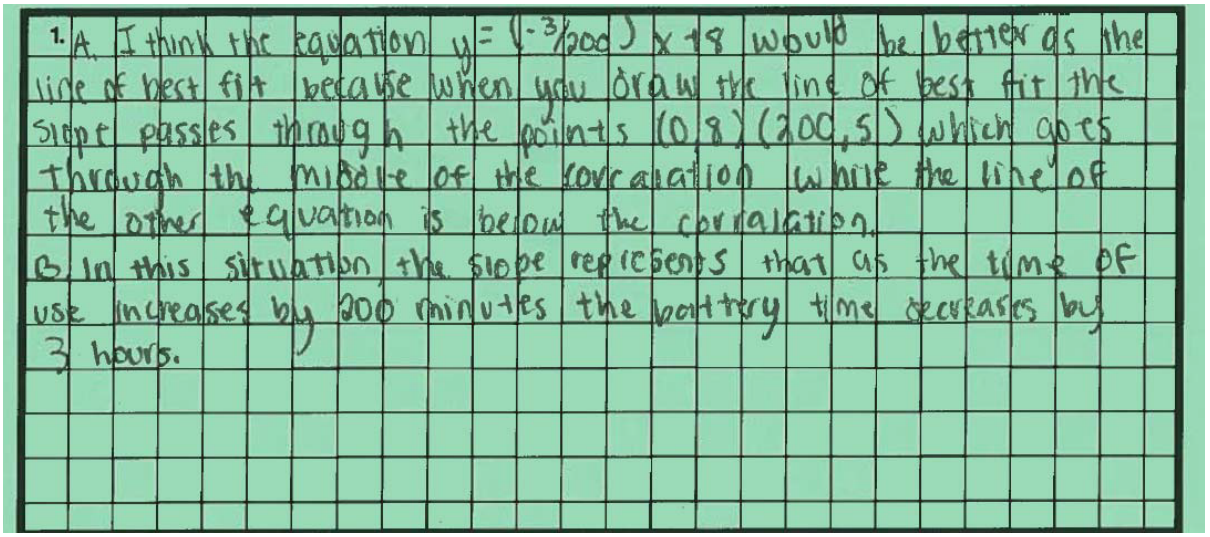
Correct Answer:

Part A: The better line of best fit would be $y = -\left(\frac{3}{200}\right)x + 8$ because it has a better distribution of points on each side of its line.

Part B: The slope represents the amount of total battery time, in hours, which the phone loses for each minute of use.

Annotated Student Response

SAMPLE 2-POINT RESPONSE



ANNOTATION – 2-POINT RESPONSE

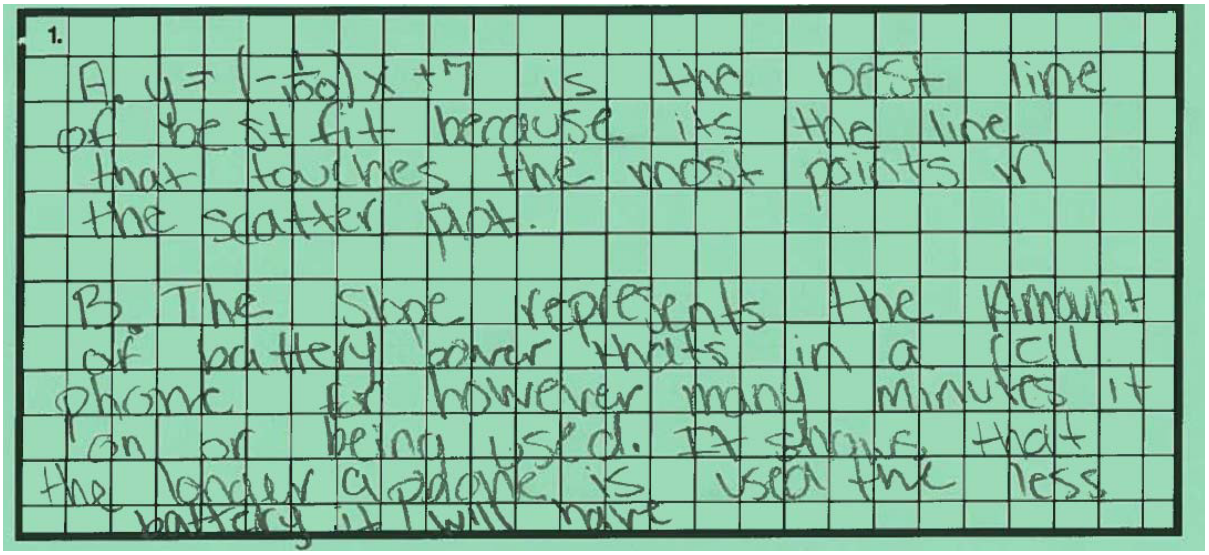
The student chooses the correct equation and explains why it is the better choice.

The student correctly explains what the slope represents.

Overall, the student earns 2 points.

Annotated Student Response

SAMPLE 1-POINT RESPONSE



ANNOTATION – 1-POINT RESPONSE

The student demonstrates partial understanding.

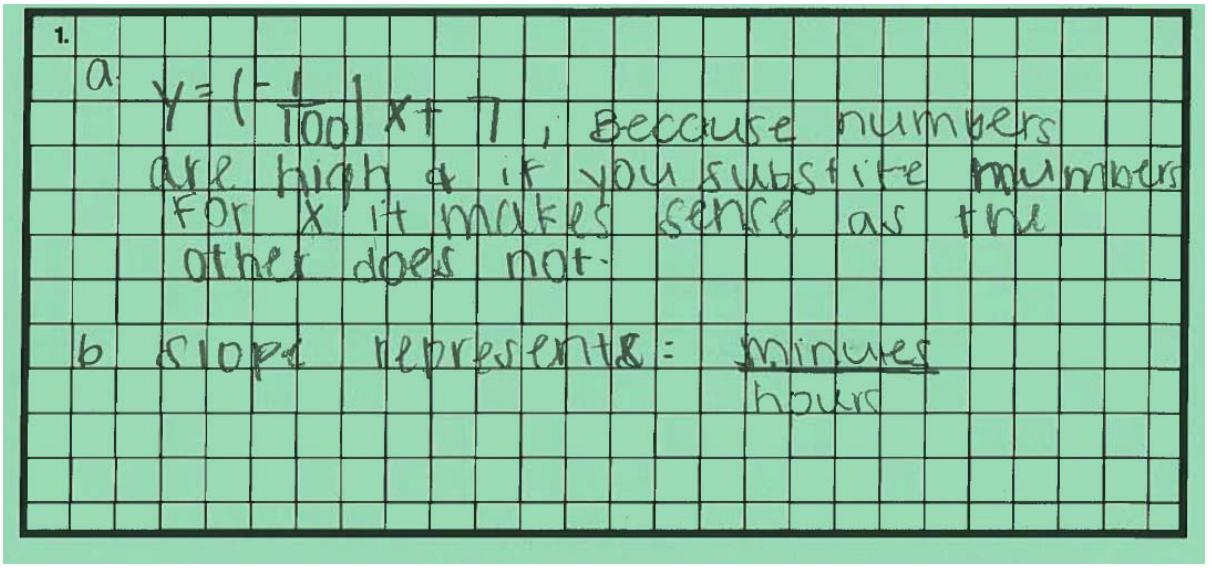
The student does not choose the better of the two equations.

The student correctly explains what the slope represents.

Overall, the student earns 1 point.

Annotated Student Response

SAMPLE 0-POINT RESPONSE



ANNOTATION – 0-POINT RESPONSE

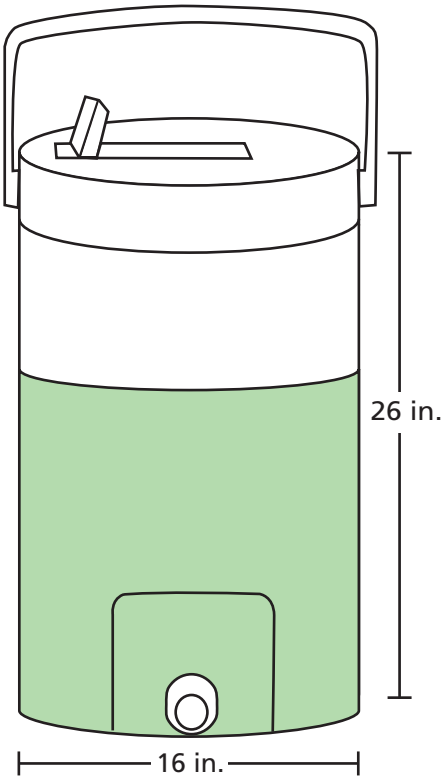
The student does not choose the better of the two equations.

The student incorrectly explains the slope as the relationship between minutes and hours.

Overall, the student earns 0 points.

7

A cooler was filled to the fill line. The fill line is 1 inch from the top. The cooler is in the shape of a right circular cylinder with a height of 26 inches and a diameter of 16 inches, as shown below.



After 6 hours the cooler was $\frac{1}{4}$ full. What was the average amount of ice water used each hour? Show your work or explain your thinking.

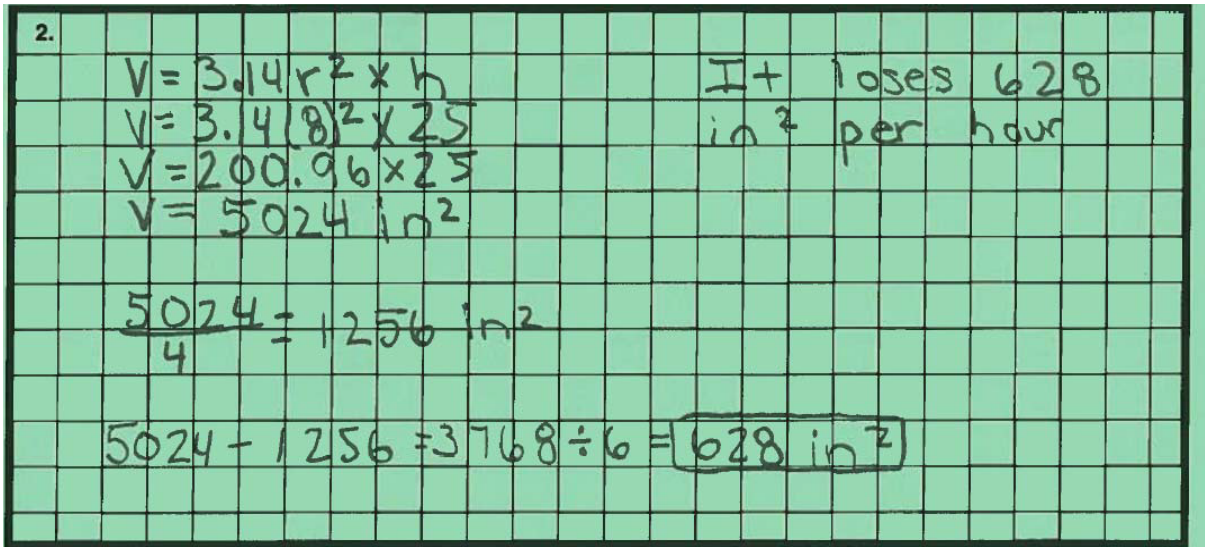
RUBRIC	
Score Point 2	• You complete all components of the question and communicate ideas clearly. • You demonstrate an understanding of the concepts and/or processes. • You provide a correct answer using an accurate explanation as support.
Score Point 1	• You provide a partially correct answer to the question and/or address only a portion of the question. • You demonstrate a partial understanding of the concepts and/or processes.
Score Point 0	• Your answer is totally incorrect or irrelevant.
Blank	• You did not give any answer at all.
Note: No part can be incomplete or incorrect and receive full credit.	

Correct Answer:
628 cubic inches

The volume of the entire cylinder is $\pi(8)^2(26-1) = 1{,}600\pi \approx 5024$ cubic inches. $5024 \times \frac{3}{4} = 3768$; $3768 \div 6 = 628$ cubic inches used per hour.

Annotated Student Response

SAMPLE 2-POINT RESPONSE



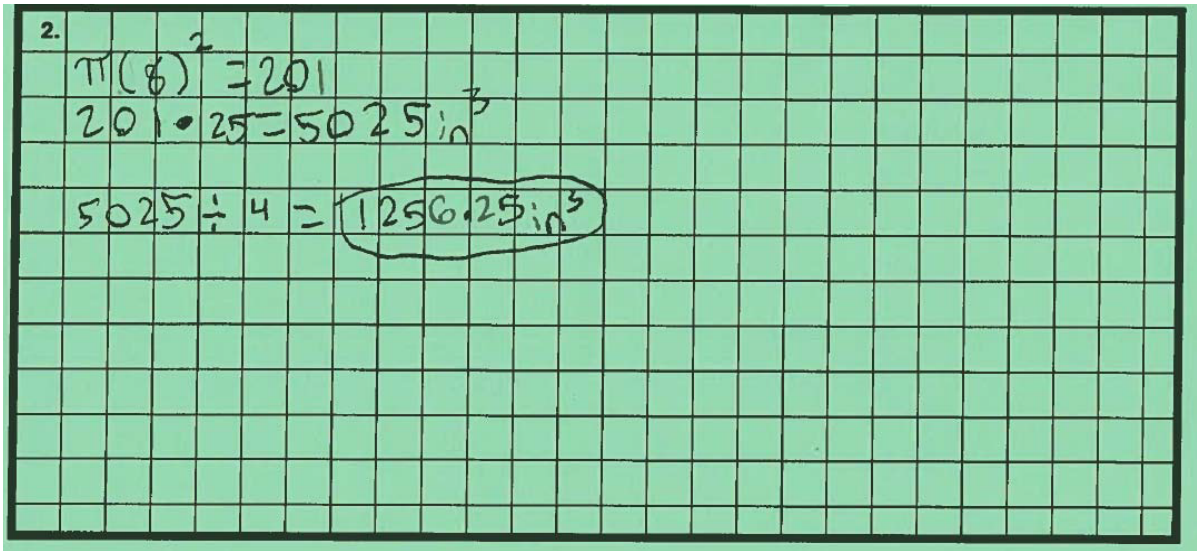
ANNOTATION – 2-POINT RESPONSE

The student finds the average amount of water used each hour and explains why this is correct.

Overall, the student earns 2 points.

Annotated Student Response

SAMPLE 1-POINT RESPONSE



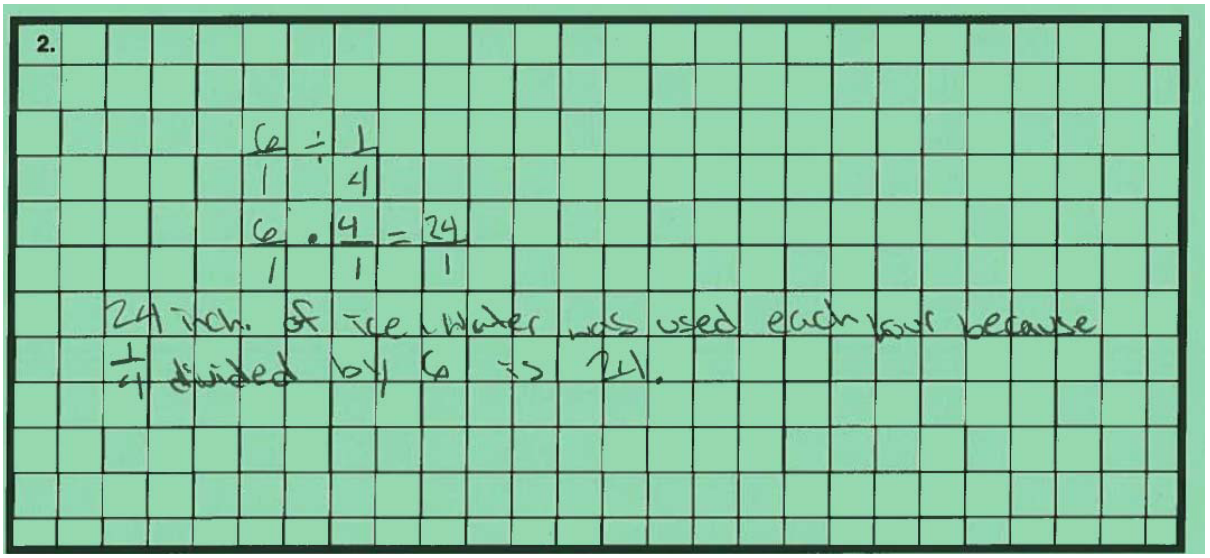
ANNOTATION – 1-POINT RESPONSE

The student finds the volume of the cylinder when it is filled and finds the volume when it is ¼ filled, but does not attempt to find the hourly rate.

Overall, the student earns 1 point.

Annotated Student Response

SAMPLE 0-POINT RESPONSE



ANNOTATION – 0-POINT RESPONSE

The student uses an incorrect process when attempting to find the hourly rate.

Overall, the student earns 0 points.

8

Part A On your answer document, draw a coordinate plane that uses only Quadrant 1.

- Draw the *x*-axis.
- Label the *x*-axis with the numbers 0 through 10 (use increments of 1).
- Label the *x*-axis "Time (minutes)."
- Draw the *y*-axis.
- Label the *y*-axis with the numbers 0 through 1,000 (use increments of 100).
- Label the *y*-axis "Data Downloaded (megabytes)."

Part B On your coordinate plane, draw a graph using the following description: A computer is downloading a new program that has a total of 500 megabytes at a rate of 50 megabytes per minute. The computer already has 200 megabytes of data that was downloaded from a previous program.

Part C Write the equation of the graph.

Part D Explain what your graph represents. Include in your response whether the graph is linear or nonlinear, a function or not a function, and increasing or decreasing.

RUBRIC	
Score Point 4	Student scores 4 points.
Score Point 3	Student scores 3 – 3.5 points.
Score Point 2	Student scores 2 – 2.5 points.
Score Point 1	Student scores 0.5 – 1.5 points. OR Student demonstrates minimal understanding of sketching or analyzing a graph.
Score Point 0	Student's response is totally incorrect or irrelevant.
Blank	No student response.
Note: No part can be incomplete or incorrect and receive full credit.	

Score Points

Part a: score 1 point — correctly draws and labels the coordinate axes as described

deduct 0.25 point for each of the following: incorrect or missing title, incorrect or missing label, incorrect number line, incorrect or missing data points
(maximum deduction of 1.0 point)

OR

score 0.5 point — shows some understanding of constructing a coordinate plane

Part b: score 1 point — correctly sketches the graph

OR

score 0.5 point — some correct procedure

Part c: score 1 point — writes a correct equation

OR

score 0.5 point — writes a correct expression (leaves out the dependant variable "*y*")
OR
explains the equation instead of writing the equation

Part d: score 1 point — correct answer with correct and complete work or explanation

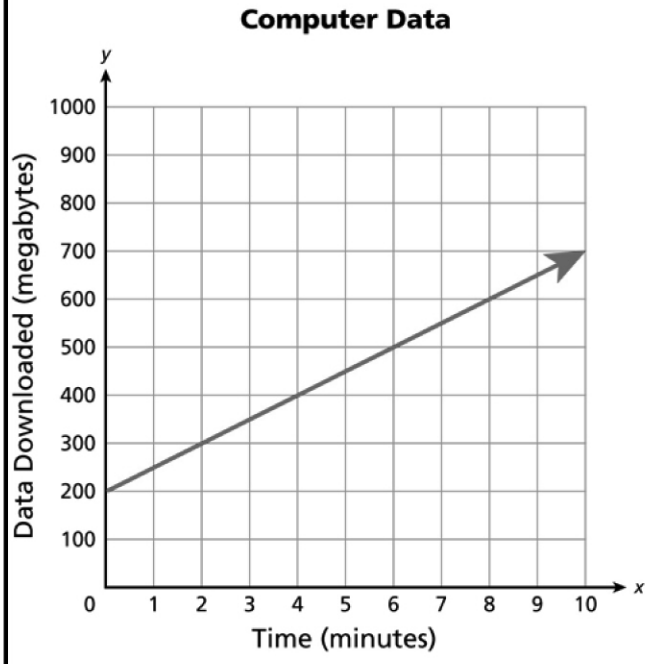
OR

score 0.5 point — correct answer with incomplete work or explanation
OR
some correct procedure
OR
vague explanation only

Correct Answer:

Part A: Student draws a coordinate plane as described.

Part B: The line should begin at 200 on the *y*-axis and run through points (0, 200), (2, 300), (4, 400), (6, 500), (8, 600), and (10, 700) for a slope of 50.



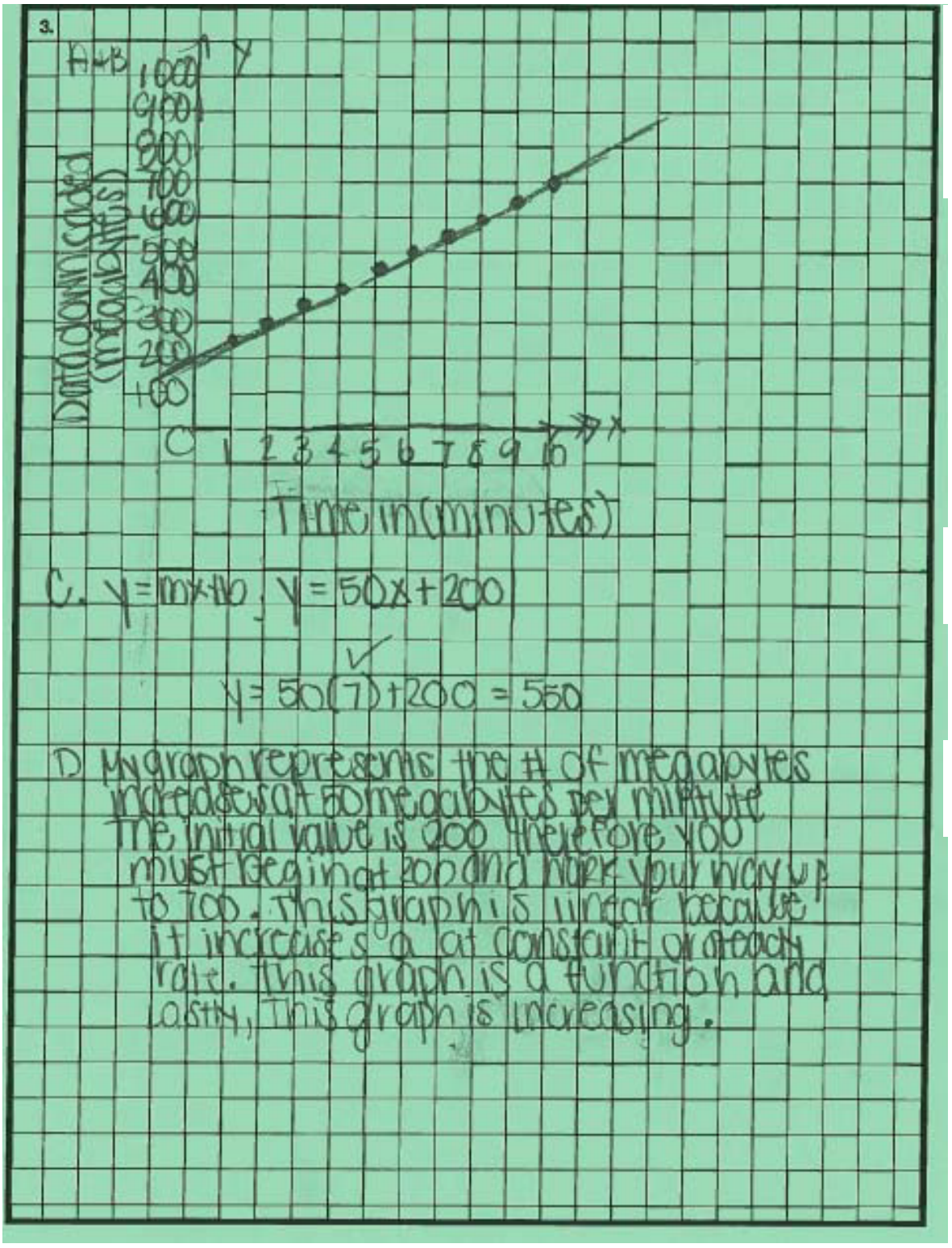
Part C: $y = 50x + 200$

Part D: The graph is a linear because it is a line with a constant rate. It is a function because each *x*-value has only one *y*-value assigned to it. It is increasing because the line begins on the lower left and ends on the upper right.

Annotated Student Response

SAMPLE 4-POINT RESPONSE

NOTES



A 1.0

B 1.0

C 1.0

D 1.0

ANNOTATION - 4-POINT RESPONSE

A The student correctly draws and labels the x and y axes. (1 point)

B The student draws a graph with the correct slope that crosses through all relevant points. (1 point)

C The student writes the correct equation for the graph. (1 point)

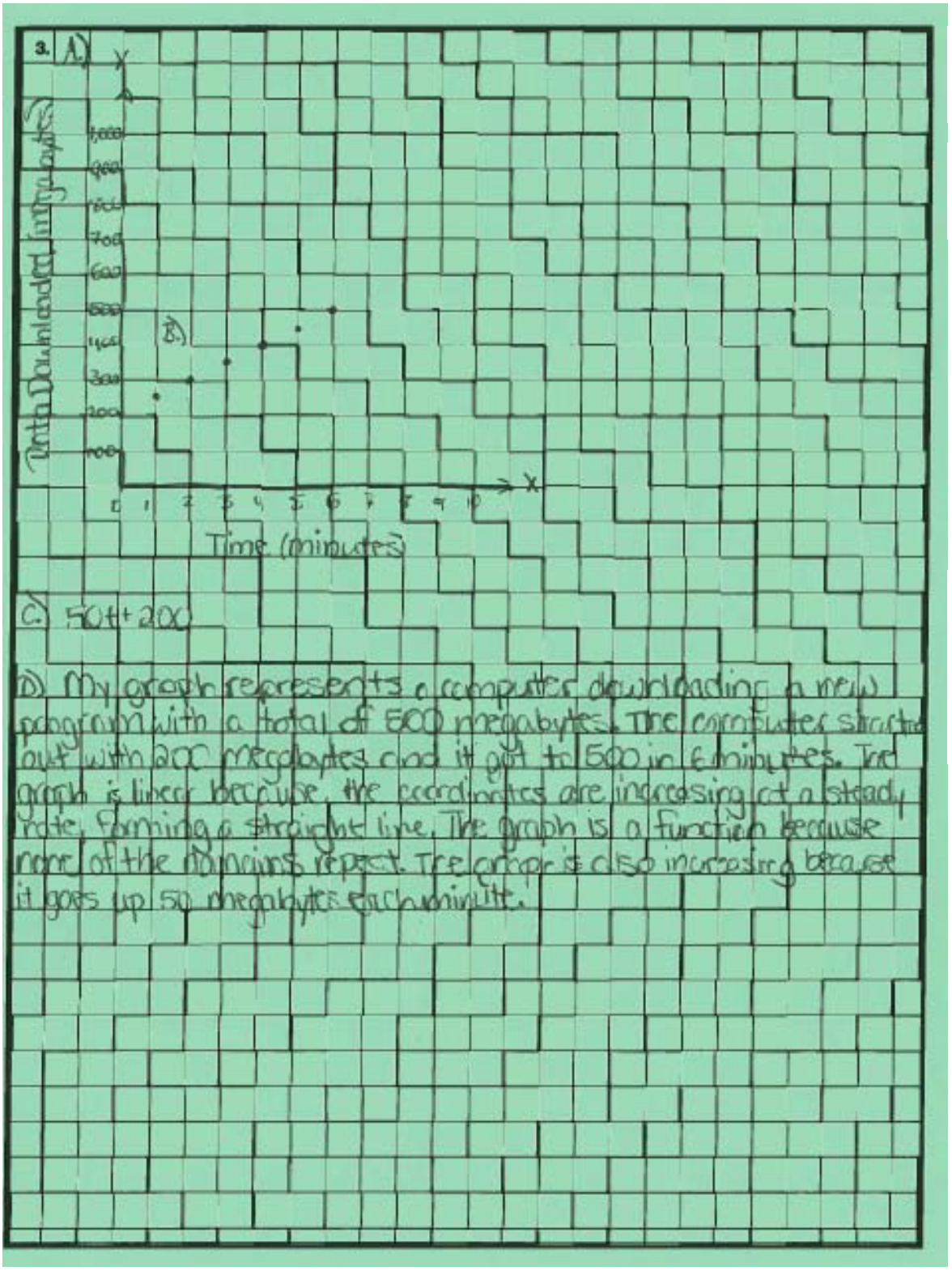
D The student correctly indicates that the graph is linear, increasing, and is a function. (1 point)

Overall, the student earns 4 points.

Annotated Student Response

SAMPLE 3-POINT RESPONSE

NOTES



A 1.0

B 0.5

C 0.5

D 1.0

ANNOTATION - 3-POINT RESPONSE

A The student correctly draws and labels the x and y axes. (1 point)

B The student plots all of the relevant points but does not draw a line connecting these points. (0.5 points)

C The student writes the slope as part of an expression instead of an equation. (0.5 points)

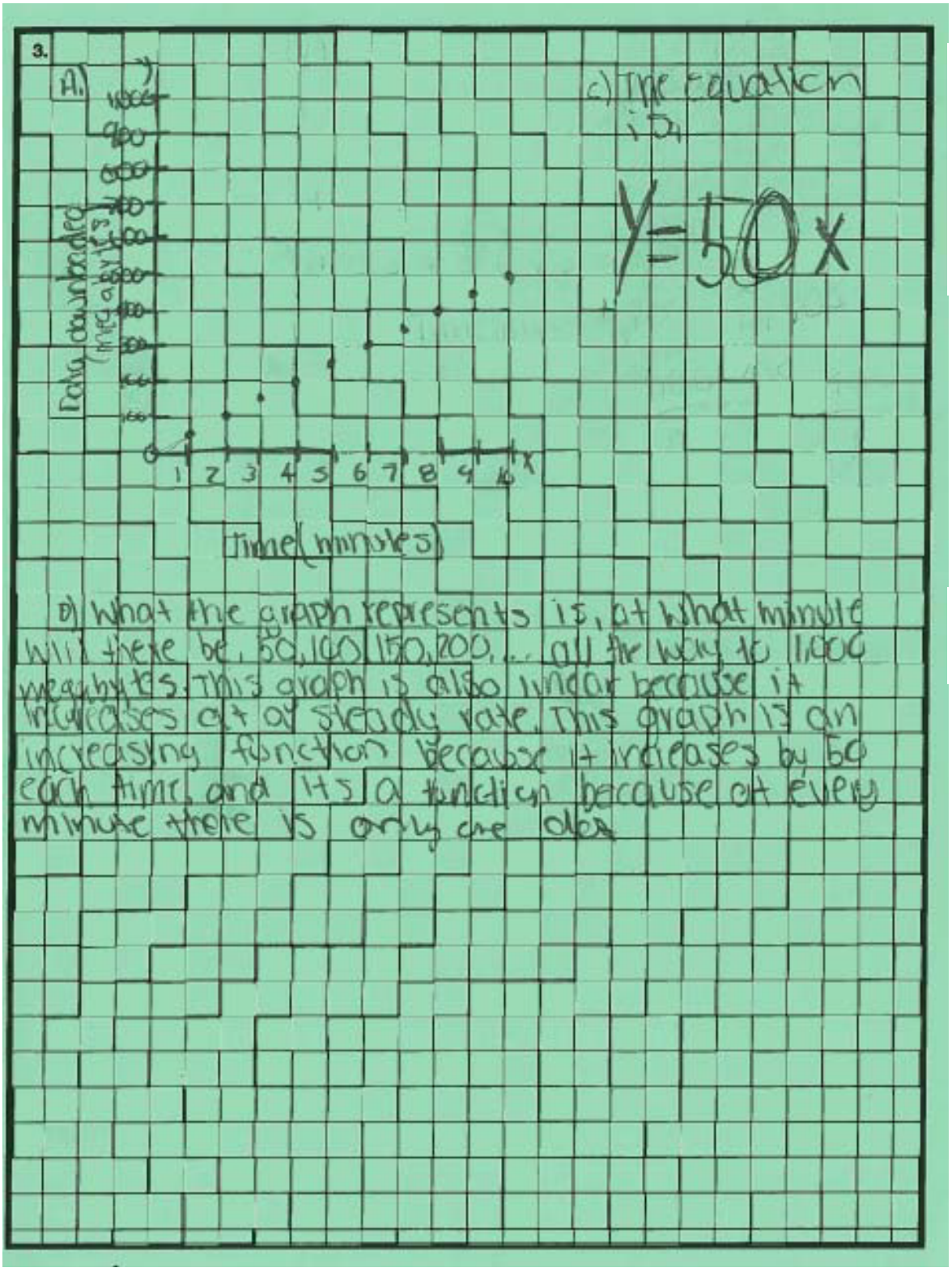
D The student correctly indicates that the graph is linear, increasing, and is a function. (1 point)

Overall, the student earns 3 points.

Annotated Student Response

SAMPLE 2-POINT RESPONSE

NOTES



A 1.0

B 0.0

C 0.5

D 1.0

ANNOTATION - 2-POINT RESPONSE

A The student correctly draws and labels the x and y axes. (1 point)

B The student begins the line at (0,0) instead of (0,200), creating an incorrect line. (0 points)

C The student writes the slope of a correct equation based on the incorrect line. (0.5 points)

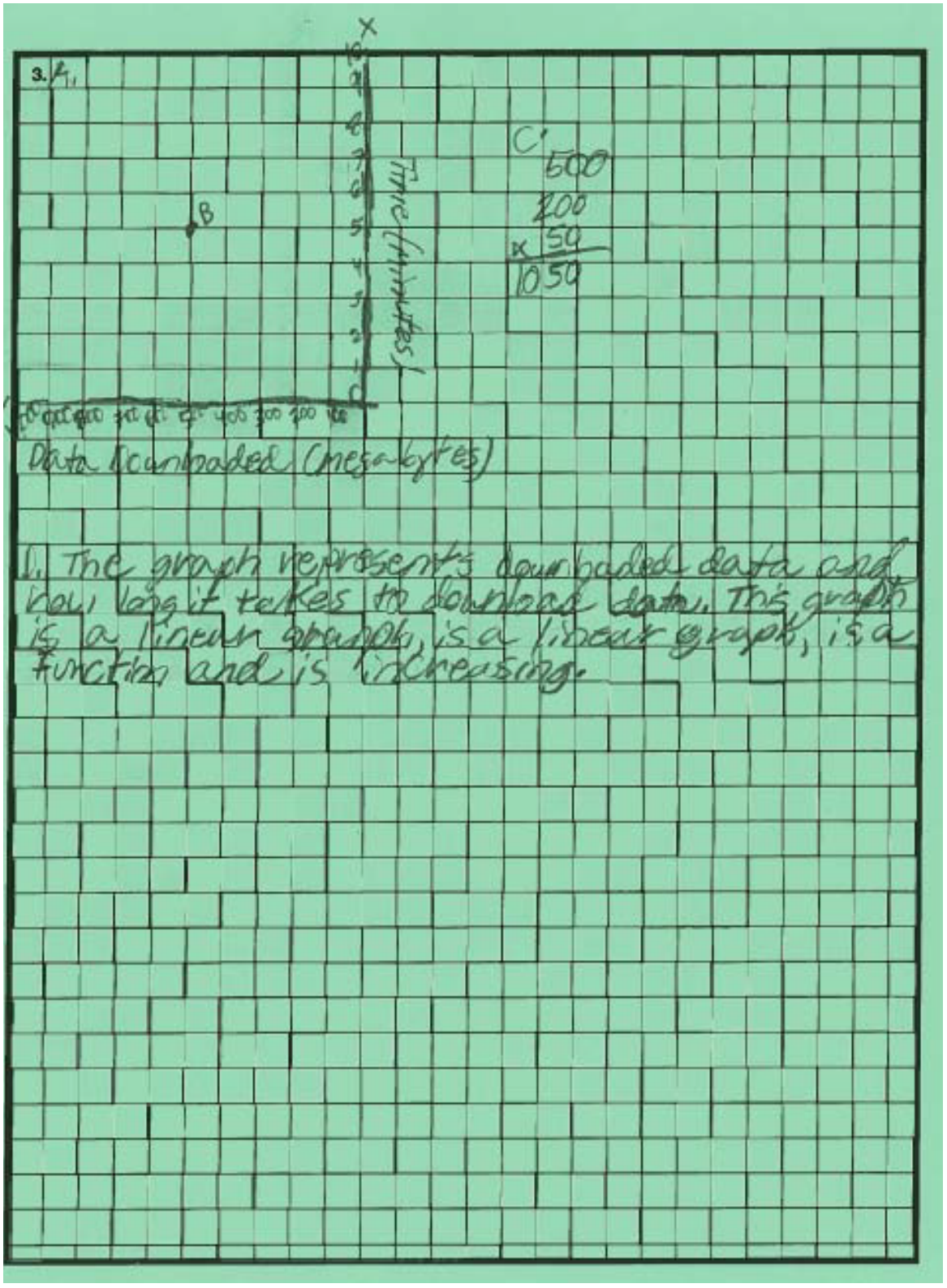
D The student correctly indicates that the graph is linear, increasing, and is a function. (1 point)

Overall, the student earns 2.5 points.

Annotated Student Response

SAMPLE 1-POINT RESPONSE

NOTES



A 0.0

B 0.0

C 0.0

D 1.0

ANNOTATION - 1-POINT RESPONSE

A The student reverses the x and y axes and labels them based on this error. (0 points)

B The student plots one incorrect point. (0 points)

C The student writes an incorrect equation for the graph. (0 points)

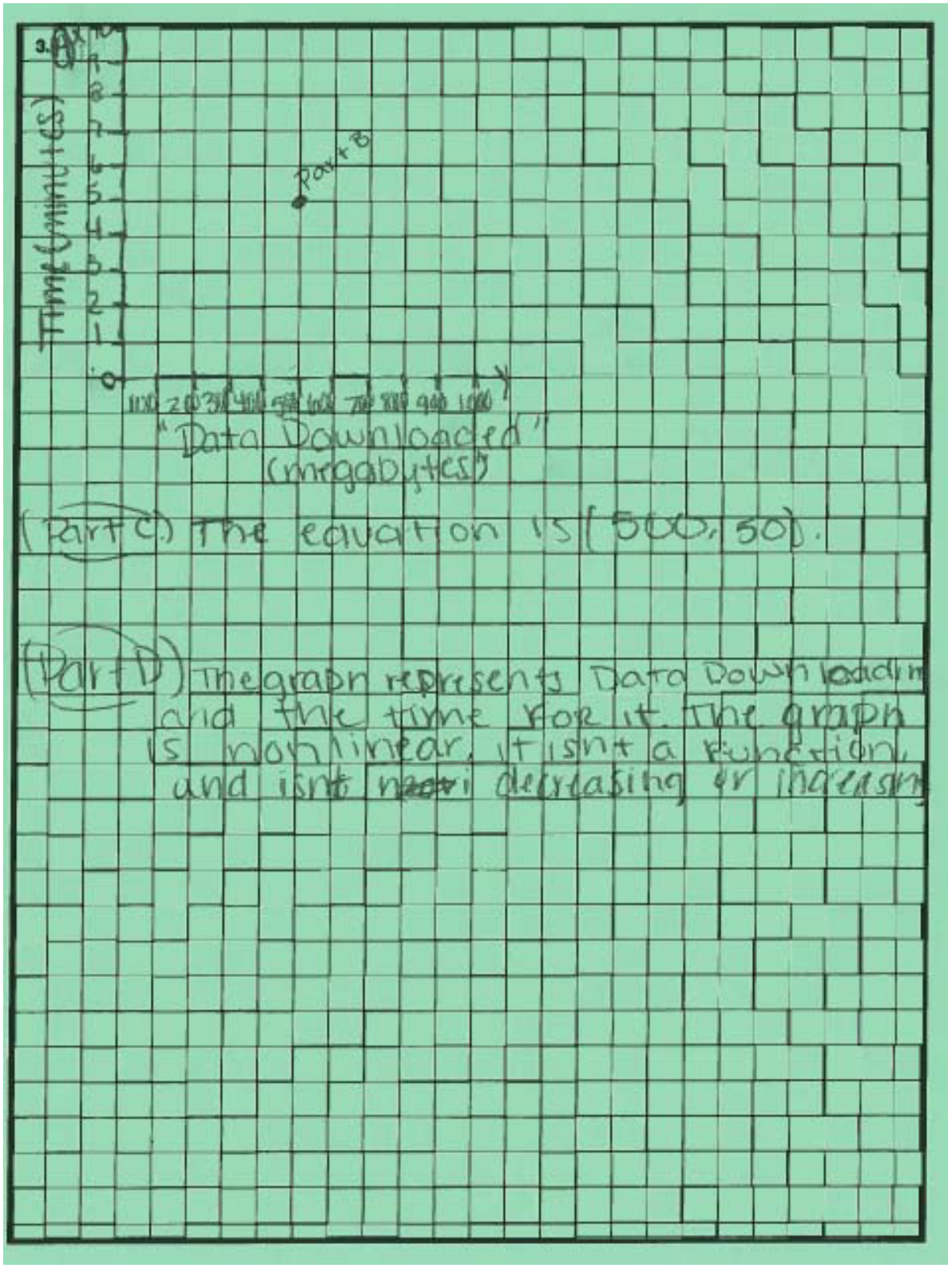
D The student correctly indicates that the graph is linear, increasing, and is a function. (1 point)

Overall, the student earns 1 point.

Annotated Student Response

SAMPLE 0-POINT RESPONSE

NOTES



A 0.0

B 0.0

C 0.0

D 0.0

ANNOTATION - 0-POINT RESPONSE

A The student reverses the x and y axes and labels them based on this error. (0 points)

B The student plots one incorrect point. (0 points)

C The student gives the coordinates for the incorrect plotted point and does not attempt to write an equation. (0 points)

D The student incorrectly states that the graph is nonlinear, not a function, and is neither increasing nor decreasing. (0 points)

Overall, the student earns 0 points.

Item Information

Question Number	Key	DOK*	KCAS Primary Standard**
1	D	1	8.SP.1
2	C	2	8.G.4
3	A	1	8.F.4
4	D	1	8.EE.8a
5	D	1	8.NS.1
6	NA	3	8.SP.3
7	NA	3	8.G.9
8	NA	3	8.F.5

*DOK is the abbreviation for Depth of Knowledge. Please note that DOK is associated to the complexity level of an assessment item and is not aligned to the standard. Further information regarding DOK can be accessed on the Kentucky Department of Education website: http://www.education.ky.gov/kde/instructional+resources/curriculum+documents+and+resources/core+content+for+assessment/core+content+for+assessment+4.1/content+specific+core+content+for+assessment+dok+support+materials.htm.

**Further information regarding Common Core Standards can be accessed on the Common Core website: http://www.corestandards.org.